421816

FLOOD INSURANCE STUDY

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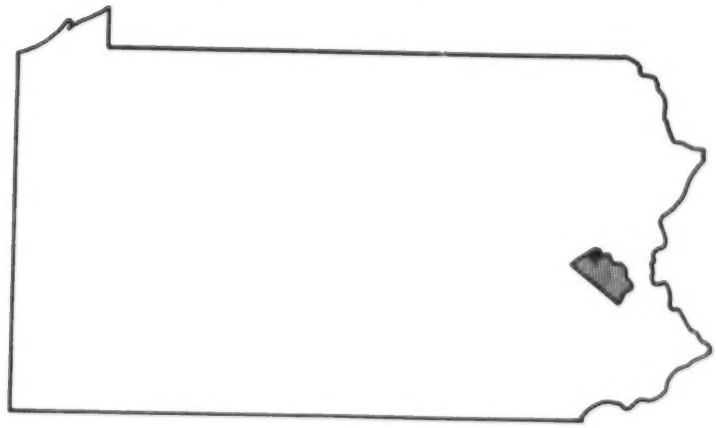
TOWNSHIP OF WASHINGTON, PENNSYLVANIA
LEHIGH COUNTY



OCTOBER 15, 1980

federal emergency management agency
federal insurance administration

COMMUNITY NUMBER - 421816

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TABLE OF CONTENTS

		Page
1.0	INTRODUCTION	1
1.1	Purpose of Study	1
1.2	Authority and Acknowledgements	1
1.3	Coordination	1
2.0	AREA STUDIED	2
2.1	Scope of Study	2
2.2	Community Description	2
2.3	Principal Flood Problems	7
2.4	Flood Protection Measures	8
3.0	ENGINEERING METHODS	8
3.1	Hydrologic Analyses	9
3.2	Hydraulic Analyses	9
4.0	FLOOD PLAIN MANAGEMENT APPLICATIONS	11
4.1	Flood Boundaries	11
4.2	Floodways	11
5.0	INSURANCE APPLICATION	12
5.1	Reach Determinations	14
5.2	Flood Hazard Factors	15
5.3	Flood Insurance Zones	15
5.4	Flood Insurance Rate Map Description	17

TABLE OF CONTENTS - continued

	Page
6.0 OTHER STUDIES	17
7.0 LOCATION OF DATA	18
8.0 BIBLIOGRAPHY AND REFERENCES	18

FIGURES

Figure 1 - Vicinity Map	3
Figure 2 - Floodway Schematic	14

TABLES

Table 1 - Summary of Discharges	9
Table 2 - Floodway Data	13
Table 3 - Flood Insurance Zone Data	16

EXHIBITS

Exhibit 1 - Flood Profiles
Lehigh River Panels 01P-02P

Exhibit 2 - Flood Boundary and Floodway Map Index

Exhibit 3 - Flood Boundary and Floodway Map

PUBLISHED SEPARATELY:

Flood Insurance Rate Map Index

Flood Insurance Rate Map

FLOOD INSURANCE STUDY
TOWNSHIP OF WASHINGTON, PENNSYLVANIA

1.0 INTRODUCTION

1.1 Purpose of Study

This Flood Insurance Study investigates the existence and severity of flood hazards in the Township of Washington, Lehigh County, Pennsylvania, and aids in the administration of the National Flood Insurance Act of 1968 and the Flood Disaster Protection Act of 1973. This study will be used to convert Washington to the regular program of flood insurance by the Federal Insurance Administration (FIA). Local and regional planners will use this study in their efforts to promote sound flood plain management.

In some states or communities, flood plain management criteria or regulations may exist that are more restrictive or comprehensive than those on which these federally-supported studies are based. These criteria take precedence over the minimum federal criteria for purposes of regulating development in the flood plain, as set forth in the Code of Federal Regulations at 44 CFR, 60.3. In such cases, however, it shall be understood that the state (or other jurisdictional agency) shall be able to explain these requirements and criteria.

1.2 Authority and Acknowledgements

The source of authority for this Flood Insurance Study is the National Flood Insurance Act of 1968 and the Flood Disaster Protection Act of 1973.

The hydrologic and hydraulic analyses for this study were prepared by Pickering, Corts and Summerson, Inc., for the Federal Insurance Administration, under Contract No. H-4758. This work was completed in October 1979.

1.3 Coordination

On April 27, 1978, streams to be studied by detailed methods were identified at an initial Consultation and Coordination Officer's (CCO) meeting attended by representatives of the FIA, the Township of Washington, and Pickering, Corts, and Summerson, Inc., the study contractor. The results of the hydrologic analyses were coordinated

with the U. S. Army Corps of Engineers (COE) and the U. S. Geological Survey (USGS). On April 18, 1980, a final CCO meeting was held with representatives of the FIA, the township, and the study contractor to present the results of the study.

2.0 AREA STUDIED

2.1 Scope of Study

This Flood Insurance Study covers the incorporated area of the Township of Washington, Lehigh County, Pennsylvania. The Borough of Slatington is not included in this study. The area of study is shown on the Vicinity Map (Figure 1).

The Lehigh River was studied by detailed methods. The areas studied by detailed methods were selected with priority given to all flood hazard areas and areas of projected development and proposed construction for the next five years, through October 1984.

Tributary No. 1 to the Lehigh River, Trout Creek, Tributary Nos. 1 and 2 to Trout Creek, Mill Creek, and Welshtown Creek were studied by approximate methods. Approximate methods of analysis were used to study those areas having low development potential and minimal flood hazards as identified at the initiation of the study. For Welshtown Creek, negligible flood hazards were found to exist and no flood boundaries were mapped. The scope and methods of study were proposed to and agreed upon by the FIA.

2.2 Community Description

The Township of Washington is located along Blue Mountain in the northern portion of Lehigh County, in eastern Pennsylvania. It contains a total land area of 24.5 square miles and is bordered by the Borough of Walnutport and the Township of Lehigh to the east, the Township of East Penn to the north, the Township of Heidelberg to the west, and the Township of North Whitehall to the south. The northeast extension of the Pennsylvania Turnpike bisects Washington into east and west halves. It is a part of the area of Pennsylvania called the Great Valley Region (Reference 1).

The iron industry was the first major non-agrarian development in the area. Slate quarrying also began in the early 1800s but did not become commercialized until 1844. Washington was formed from the eastern half of the Township of Heidelberg in 1847 and became the major slate producer for the United States. Despite increasing

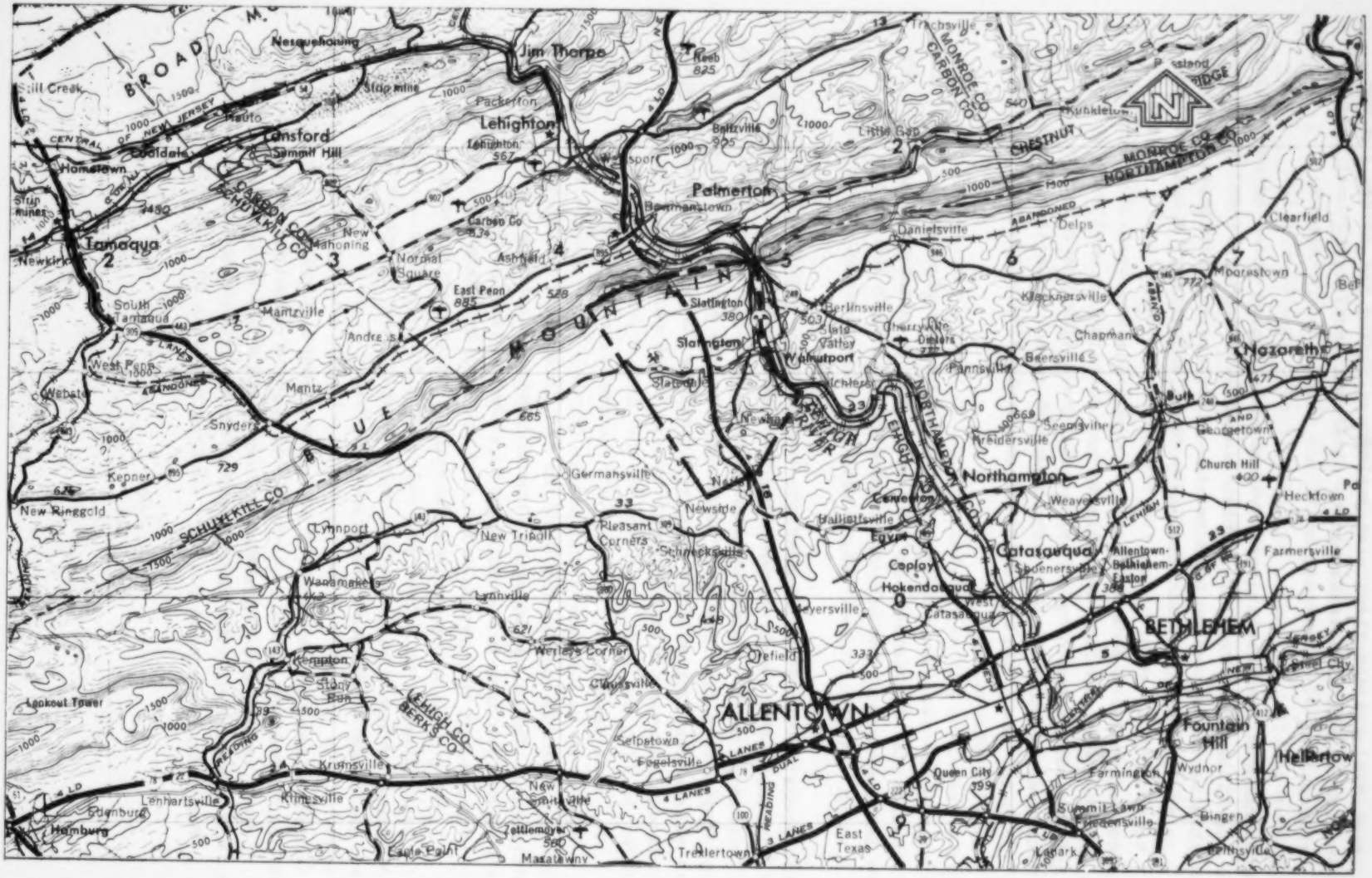


FIGURE 1

FEDERAL EMERGENCY MANAGEMENT AGENCY
Federal Insurance Administration

TOWNSHIP OF WASHINGTON, PA
(LEHIGH CO.)

APPROXIMATE SCALE
4 0 4 8 12 MILES

VICINITY MAP

emphasis on non-agricultural employment during the 1900s, the majority of the land in Washington has remained agricultural (Reference 1).

Washington lies within the physiographic region known as the Valley and Ridge Province, Appalachian (Lehigh) Valley section. The township is characterized by moderate relief, with the highest elevation in the township, 1,700 feet, atop Blue (Kittatinny) Mountain. The topography is severe, but the elevations of other hills are small in comparison with Blue Mountain. These hills are generally symmetrically round and flat-topped and vary in height from 650 to 1,000 feet. The topography is characteristic of the slate region and is unique in Lehigh County. The southern part of the township enters into the Great Valley region of the county where the land is nearly level (Reference 1).

There are two gaps in Blue Mountain which are physiographically significant. The Lehigh Gap is a water gap formed by erosion from the Lehigh River. The Lehigh Furnace Gap is a wind gap cut by a stream which was diverted elsewhere after eroding the gap (Reference 1).

Approximately 46 percent of the township has a slope of less than 10 percent. Twenty-three percent of the township has a slope of 10-15 percent. Together, these areas comprise the township's areas of possible development. Washington has 15 percent of its area possessing slopes of 15-25 percent, while 16 percent of the township contains areas with slopes in excess of 25 percent (Reference 1).

The most important regional watercourse is the Lehigh River, which begins in Wayne County and passes through Pennsylvania for 100 miles prior to its confluence with the Delaware River at Easton, Pennsylvania. The river serves as the boundary between Lehigh and Northampton Counties and also serves as the eastern boundary of the Township of Washington. The Lehigh River drainage area encompasses 1,368 square miles, with an average bottom gradient within the area being studied of 8 feet per mile. The flood plains are wide on both sides of the river, but extensive development is absent in the flood plains of Washington (Reference 1).

Trout Creek drains most of Washington and a portion of the Township of Heidelberg. Little Trout Creek is the principal tributary to Trout Creek, which discharges into the Lehigh River at the Borough of Slatington. The headwaters of Trout Creek are located on Blue Mountain (Reference 1).

Coplay Creek, which flows southeast to the Lehigh River in the Township of Whitehall, and its tributaries drain the southeast corner of the township. Mill Creek, which empties into Jordan Creek, and its tributaries drain the southwest section of the township (Reference 1). While the flood plains of the Lehigh River are relatively wide within Washington, the flood plains associated with the other streams in the township are well defined and rather narrow. The streams are well channelized, owing to the underlying geology which historically allowed for eroding cuts to penetrate the peneplain rather than continue meandering (Reference 1).

The flood plains of the creeks and tributaries in the township generally are characterized by alluvial soils in the Andover, Atkins, Comly, and Philo soils series. These soils are depositions of sediment washed downstream during periods of flooding or are the remnants of streambeds from earlier times (Reference 1).

There are a number of springs located in the northwest portion of the township, and the soils associated with them are characterized by high-water tables. Portions of these areas serve as watershed lands for the Borough of Slatington Water Company and the Washington Water Supply Company (Reference 1).

The geology of Washington includes two formations, the Martinsburg (Upper and Lower) and the Shawangunk (also called Tuscarora). The Martinsburg formation is a sedimentary deposit composed of an upper sandy portion and a lower shaly or slaty part. The Shawangunk formation is characterized by coarse conglomerate rock. The exact line of juncture between the Martinsburg and Shawangunk formations is not precisely identified but generally follows the path of talus along Blue Mountain (Reference 1).

The slate formations are of the Martinsburg formation, which was subjected to extensive lateral pressures. The area now encompassed by Washington possessed 75 separate slate quarries, and this group of quarries, called the Slatington Group, was the major slate producer of the United States (Reference 1).

Groundwater in the Shawangunk formation is scarce unless obtained by the drilling of exceptionally deep wells, which would be costly since the conglomerate rocks are hard. Because of the impervious nature of the rock formations, any groundwater obtained will have little mineral content and be soft. In the Martinsburg formation, aquifer recharge is slow, since water does not seep through the slate and shale beds except by passing through joints, bedding planes, and cleavage planes.

The potential for the occurrence of large underground streams is small. Groundwater obtained from the Martinsburg area is of good quality except where groundwater recharge has been through pyrite mineral deposits, when sulphur enters the water and renders it undrinkable. The inability of rain to rapidly percolate and recharge groundwater supplies provides an advantage in that there are an exceedingly large number of springs found in the township. The yearly flow of these springs results in the constant flow of the township's streams (Reference 1).

The undeveloped area of Washington consists of agricultural land and woodlands, which comprise almost 80 percent of the township area. Washington is heavily wooded in the northern sector, with smaller woodlots uniformly scattered through the township. One particular undeveloped landform is the slate spoil piles that form a belt through the center of the township. They present special aesthetic problems (Reference 1).

Vegetative cover in Washington consists of agricultural fields and grassland, with mature, oak-hickory deciduous forests representing ecological climax communities. Blue Mountain is completely forested and is the only continuous wooded area in the township. The importance of the mountain cannot be overemphasized, since it buffers summer temperatures and acts as a sponge or sink for atmospheric pollutants, thus allowing township residents to enjoy a high ambient air quality (Reference 1).

The climate of Washington is continental, owing to the absence of a buffering effect from the Atlantic Ocean. The mountain-valley influence on climatic conditions causes greater temperature extremes in the township than are experienced elsewhere in the Lehigh Valley. Cool air masses moving through valleys of the township cause freezing conditions later in spring and earlier in fall. The growing season is approximately 130 days. The average January temperature is 29.0 degrees Fahrenheit (°F) and the July average is 74.1°F. July is generally the wettest month with 4.82 inches of rainfall, and February is the month with the greatest average snowfall. The prevailing westerly wind averages 9.5 miles per hour through the year (Reference 1). According to the U. S. Bureau of the Census, the population increased from 3,199 in 1960 to 3,732 in 1970 (References 1 and 2).

Most of the residential land use consists of single-family residences and includes mobile home units and conventional construction. A portion of the residential land use growth has been in the large subdivision development just south of the Borough of Slatington. The remainder is well scattered throughout the township; older villages such as Slatedale, Emerald and Freidens have experienced little change in their residential pattern (Reference 1).

The commercial land use pattern is somewhat different. The form of commercial use is more dependent upon the regional commercial facilities found in the Borough of Slatington and the City of Allentown area. Nevertheless, two distinct forms appear. One form is isolated, scattered commercial services found throughout the township and serving the population in the immediate area. The services are primarily for convenience goods and services and are located in the Villages of Slatedale, Emerald and Friedens. The only change since the 1960 survey has been an increase in service type facilities, such as beauty shops. However, the land requirements have not altered because most of these services are residential conversions or home occupations. The second distinct form is one of commercial strip development along State Route 873. These highway-oriented and service facilities continue to increase and serve to increase potential conflicts between the transportation function and the land use. Since 1960, this continual stripping has accounted for most of the increase in commercial land use (Reference 1).

2.3 Principal Flood Problems

The past history of flooding on streams within Washington indicates that flooding may occur during any season of the year. The worst flooding conditions are normally a result of the combination of spring rain and snowmelt, or summer storms resulting from tropical storms moving north along the east coast of the United States.

According to local information, flooding occurred on the Lehigh River in 1902, 1942, and 1955. The flood of August 19, 1955, attained a maximum discharge of 77,800 cubic feet per second (cfs), which is the highest discharge recorded at the Walnutport gaging station (No. 01451000) since it began operation in October 1946. The Walnutport gaging station is opposite Washington on the Lehigh

River. Each of the floods crested higher than the 100-year flood, causing damage to structures adjacent to the river.

The elevation of a high-water mark at the Walnutport gaging station, from the August 19, 1955 flood, was 367.95 feet. The elevation of the water surface of the estimated 100-year flood at this same location is 364.50 feet.

2.4 Flood Protection Measures

There are two major flood protection structures upstream of Washington which regulate runoff from 384 square miles of the drainage basin. The Francis E. Walter Reservoir on the Lehigh River is located approximately 35 miles upstream from Washington and regulates flow from 288 square miles, with 108,000 acre-feet of storage allocated to flood control. This dam has been in operation since December 1960. Beltzville Lake and Dam is located on Pohopoco Creek, a tributary of the Lehigh River, approximately 5 miles upstream from Washington. This structure, in operation since February 1971, regulates 96.3 square miles of drainage area, with 27,000 acre-feet of storage allocated to flood control.

At present, there are no flood protection structures within the township limits. However, there are non-structural measures of flood protection being utilized to prevent future flood damage. These are in the form of land-use regulations adopted from the Code of Federal Regulations, which will control building within areas that have a high risk of flooding.

3.0 ENGINEERING METHODS

For the flooding source studied in detail in the community, standard hydrologic and hydraulic study methods were used to determine the flood hazard data for this study. Flood events of a magnitude which are expected to be equalled or exceeded once on the average during any 10-, 50-, 100-, or 500-year period (recurrence interval) have been selected as having special significance for flood plain management and for flood insurance premium rates. These events, commonly termed the 10-, 50-, 100-, and 500-year floods, have a 10-, 2-, 1-, and 0.2-percent chance, respectively, of being equalled or exceeded during any year. Although the recurrence interval represents the long-term average period between floods of a specific magnitude, rare floods could occur at short intervals or even within the same year. The risk of experiencing a rare flood increases when periods greater than one year are considered. For example,

the risk of having a flood which equals or exceeds the 100-year flood (one-percent chance of annual occurrence) in any 50-year period is about 40 percent (four in ten) and, for any 90-year period, the risk increases to about 60 percent (six in ten). The analyses reported here reflect flooding potentials based on conditions existing in the community at the time of completion of this study. Maps and flood elevations will be amended periodically to reflect future changes.

3.1 Hydrologic Analyses

Hydrologic analyses were carried out to establish the peak discharge-frequency relationships for floods of the selected recurrence intervals for the flooding source studied in detail affecting the community.

For the Lehigh River, the hydrologic analyses were based on the Lehigh River peak discharges presented in the Flood Insurance Study for the Borough of Walnutport (Reference 3). The Walnutport flood-flow frequency analysis was based on a COE regional frequency study (Reference 4), which was developed following the standard log-Pearson Type III analysis outlined by the Water Resources Council (Reference 5).

A summary of drainage area-peak discharge relationships for the Lehigh River is shown in Table 1, "Summary of Discharges."

TABLE 1 - SUMMARY OF DISCHARGES

FLOODING SOURCE AND LOCATION	DRAINAGE AREA (sq. miles)	PEAK DISCHARGES (cfs) 10-YEAR	50-YEAR	100-YEAR	500-YEAR
LEHIGH RIVER					
Downstream of Trout Creek at Slatington Borough	911	32,100	48,000	60,000	158,000
Upstream of Trout Creek at Slatington Borough	889	30,000	45,000	55,000	147,500

3.2 Hydraulic Analyses

Analyses of the hydraulic characteristics of the flooding source studied in detail were carried out to provide estimates of the elevations of floods of the selected recurrence intervals along this flooding source.

Cross sections for the backwater analysis of the Lehigh River were obtained from aerial photographs taken in April 1974 and April 1976 at a scale of 1"=1,000' (Reference 6); streambed sections were obtained by field measurement. All bridges and culverts were surveyed to obtain elevation data and structural geometry in order to compute significant backwater effects of these structures. Cross sections were located above and below bridges, at control locations along the stream lengths, and at significant changes in ground relief, land use, or land cover. Lehigh River surveys and hydraulics from the Borough of Walnutport Flood Insurance Study were also used as part of the hydraulic analysis (Reference 3).

Roughness coefficients (Manning's "n") for the hydraulic computations were assigned on the basis of field inspection of flood plain areas and the comparison of data on nearby basins. Roughness values for the main channel of the Lehigh River ranged from 0.027 to 0.035, and the overbank values ranged from 0.040 to 0.080.

Starting water-surface elevations for the Lehigh River were based upon Lehigh River flood profile data presented in the Township of Whitehall Flood Insurance Study and the Borough of Walnutport Flood Insurance Study (References 7 and 3). Water-surface elevations of floods of the selected recurrence intervals were computed through the use of the COE HEC-2 step-backwater computer program (Reference 8).

Flood profiles were drawn showing computed water-surface elevations to an accuracy of 0.5 foot for floods of the selected recurrence intervals. Locations of selected cross sections used in the hydraulic analyses are shown on the Flood Profiles (Exhibit 1). For stream segments for which a floodway is computed (Section 4.2), selected cross-section locations are also shown on the Flood Boundary and Floodway Map (Exhibit 3).

For the approximate study streams, the 100-year flood elevations were determined by field inspection of the area, engineering judgment, examination of available topographic mapping, and the use of the Flood Hazard Boundary Map for Washington (Reference 9). The effects of bridges, culverts, and other structures on the flood elevations were considered.

All elevations used in this study are referenced to the National Geodetic Vertical Datum of 1929 (NGVD), formerly referred to as Sea Level Datum of 1929. Locations of the elevation reference marks used in the study are shown on the maps.

The hydraulic analyses for this study are based on the effects of unobstructed flow. The flood elevations shown on the profiles are valid only if hydraulic structures remain unobstructed, and dams and other flood control structures operate properly and do not fail.

4.0 FLOOD PLAIN MANAGEMENT APPLICATIONS

The National Flood Insurance Program encourages state and local governments to adopt sound flood plain management programs. Therefore, each Flood Insurance Study includes a flood boundary map designed to assist communities in developing sound flood plain management measures.

4.1 Flood Boundaries

In order to provide a national standard without regional discrimination, the 100-year flood has been adopted by the FIA as the base flood for purposes of flood plain management measures. The 500-year flood is employed to indicate additional areas of flood risk in the community. For the stream studied in detail, the boundaries of the 100- and 500-year floods have been delineated using the flood elevations determined at each cross section; between cross sections, the boundaries were interpolated using topographic maps at a scale of 1"=200' with a contour interval of 5 feet (Reference 10). In cases where the 100- and 500-year flood boundaries are close together, only the 100-year boundary has been shown.

For the streams studied by approximate methods, the boundaries of the 100-year floods were approximated by field inspection and engineering judgment and delineated using USGS topographic maps (Reference 11).

The boundaries of the 100- and 500-year floods are shown on the Flood Boundary and Floodway Map (Exhibit 3). Small areas within the flood boundaries may lie above the flood elevations and, therefore, may not be subject to flooding. Owing to limitations of the map scale and lack of detailed topographic data, such areas are not shown.

4.2 Floodways

Encroachment on flood plains, such as artificial fill, reduces the flood-carrying capacity, increases the flood heights of streams, and increases flood hazards in areas beyond the encroachment itself. One aspect of flood plain management involves balancing the economic

gain from flood plain development against the resulting increase in flood hazard. For purposes of the Flood Insurance Program, the concept of a floodway is used as a tool to assist local communities in this aspect of flood plain management. Under this concept, the area of the 100-year flood is divided into a floodway and a floodway fringe. The floodway is the channel of a stream plus any adjacent flood plain areas that must be kept free of encroachment in order that the 100-year flood can be carried without substantial increases in flood heights. Minimum standards of the FIA limit such increases in flood heights to 1.0 foot, provided that hazardous velocities are not produced. The floodway in this report is presented to local agencies as a minimum standard that can be adopted or that can be used as a basis for additional studies.

The floodway presented in this study was computed on the basis of equal conveyance reduction from each side of the flood plains. The results of these computations are tabulated at selected cross sections for each stream segment for which a floodway is computed (Table 2).

As shown on the Flood Boundary and Floodway Map (Exhibit 3), the floodway widths were determined at cross sections; between cross sections, the boundaries were interpolated. In cases where the boundaries of the floodway and the 100-year flood are either close together or collinear, only the floodway boundary has been shown. Portions of the floodway widths of the Lehigh River are located outside the corporate limits of the Township of Washington.

The area between the floodway and the boundary of the 100-year flood is termed the floodway fringe. The floodway fringe thus encompasses the portion of the flood plain that could be completely obstructed without increasing the water-surface elevation of the 100-year flood by more than 1.0 foot at any point. Typical relationships between the floodway and the floodway fringe and their significance to flood plain development are shown in Figure 2.

5.0 INSURANCE APPLICATION

In order to establish actuarial insurance rates, the FIA has developed a process to transform the data from the engineering study into flood insurance criteria. This process includes the determination of reaches, Flood Hazard Factors (FHFs), and flood insurance zone designations for the flooding source affecting the Township of Washington.

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE[1]	WIDTH[2] (FT.)	SECTION AREA (SQ. FT.)	MEAN VELOCITY (F.P.S.)	REGULATORY (NGVD)	WITHOUT FLOODWAY (NGVD)	WITH FLOODWAY (NGVD)	INCREASE (FEET)
Lehigh River								
A	350	350	6,104	9.8	351.5	351.5	351.9	0.4
B	1,325	350	5,886	10.2	352.0	352.0	352.5	0.5
C	2,075	376	6,069	9.9	352.7	352.7	353.1	0.4
D	2,780	400	6,179	9.7	353.7	353.7	354.1	0.4
E	3,530	400	8,693	6.9	355.5	355.5	355.9	0.4
F	4,570	392	7,605	7.9	355.8	355.8	356.1	0.3
G	6,490	500	8,445	7.1	357.4	357.4	358.3	0.9
H	17,090	330	5,409	10.2	373.2	373.2	374.2	1.0
I	18,160	410	5,842	9.4	375.4	375.4	376.2	0.8
J	19,670	745	8,204	6.7	378.5	378.5	379.2	0.7
K	20,375	585	8,360	6.6	381.5	381.5	381.7	0.2
L	21,450	433	4,246	13.0	381.8	381.8	382.1	0.3
M	22,555	480	7,381	7.5	385.9	385.9	386.3	0.4

[1]Feet above corporate limits
[2]This width extends beyond corporate limits

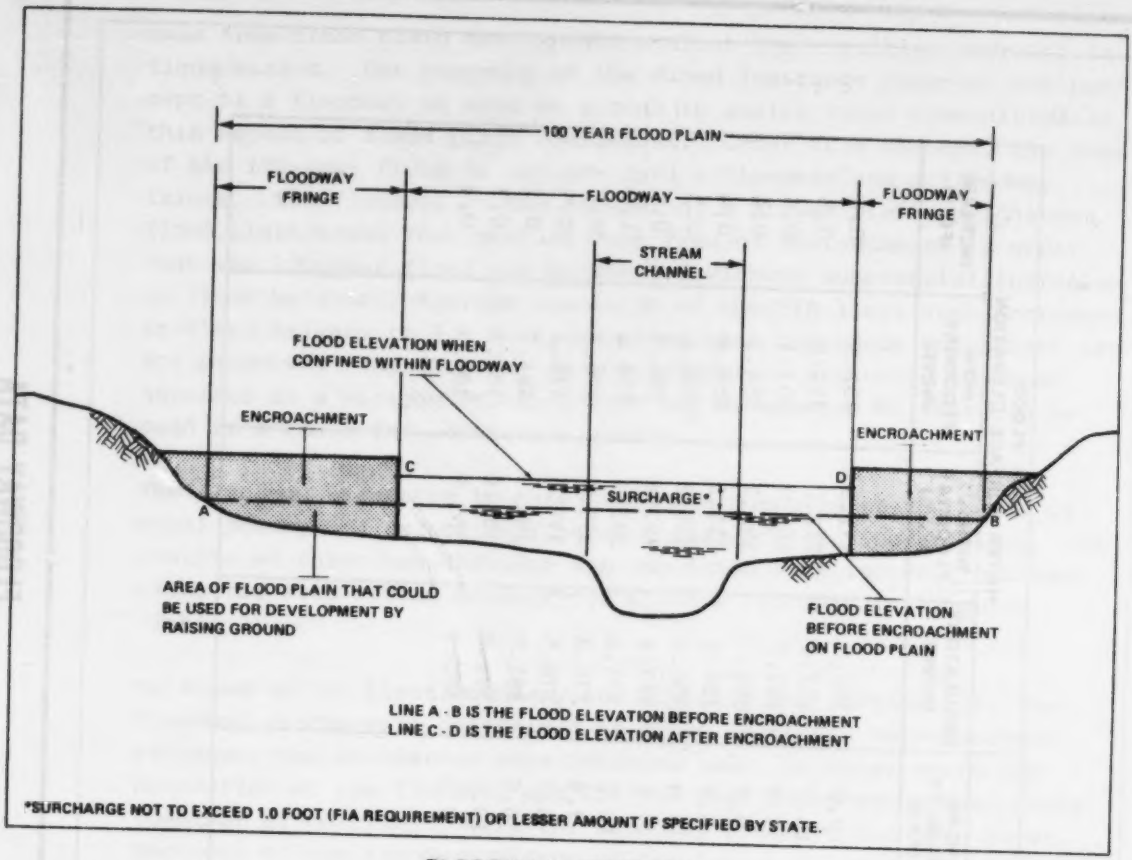
TABLE 2

FEDERAL EMERGENCY MANAGEMENT AGENCY
Federal Insurance Administration

TOWNSHIP OF WASHINGTON, PA
(LEHIGH CO.)

FLOODWAY DATA

LEHIGH RIVER



FLOODWAY SCHEMATIC

Figure 2

5.1 Reach Determinations

Reaches are defined as lengths of watercourses having relatively the same flood hazard, based on the average weighted difference in water-surface elevations between the 10- and 100-year floods. This difference does not have a variation greater than that indicated in the following table for more than 20 percent of the reach.

Average Difference Between 10- and 100-Year Floods	Variation
Less than 2 feet	0.5 foot
2 to 7 feet	1.0 foot
7.1 to 12 feet	2.0 feet
More than 12 feet	3.0 feet

The locations of the reaches determined for the flooding source of the Township of Washington are shown on the Flood Profiles (Exhibit 1) and are summarized in the Flood Insurance Zone Data Table (Table 3).

5.2 Flood Hazard Factors

The FHF is the FIA device used to correlate flood information with insurance rate tables. Correlations between property damage from floods and their FHFs are used to set actuarial insurance premium rate tables based on FHFs from 005 to 200.

The FHF for a reach is the average weighted difference between the 10- and 100-year flood water-surface elevations expressed to the nearest 0.5 foot, and shown as a three-digit code. For example, if the difference between water-surface elevations of the 10- and 100-year floods is 0.7 foot, the FHF is 005; if the difference is 1.4 feet, the FHF is 015; if the difference is 5.0 feet, the FHF is 050. When the difference between the 10- and 100-year water-surface elevations is greater than 10.0 feet, accuracy for the FHF is to the nearest foot.

5.3 Flood Insurance Zones

After the determination of reaches and their respective FHFs, the entire incorporated area of the Township of Washington was divided into zones, each having a specific flood potential or hazard. Each zone was assigned one of the following flood insurance zone designations:

Zone A:	Special Flood Hazard Areas inundated by the 100-year flood, determined by approximate methods; no base flood elevations shown or FHFs determined.
Zones A9, A10, A11:	Special Flood Hazard Areas inundated by the 100-year flood, determined by detailed methods; base flood elevations shown, and zones subdivided according to FHF.

FLOODING SOURCE	PANEL[1]	ELEVATION DIFFERENCE[2] BETWEEN 1.0% (100-YEAR) FLOOD AND			FHF	ZONE	BASE FLOOD ELEVATION[3] (NGVD)
		10% (10 YR.)	2% (50 YR.)	0.2% (500 YR.)			
Lehigh River							
Reach 1	10	-5.1	-2.0	+10.9	050	A10	Varies
Reach 2	10	-5.6	-2.3	+14.5	055	A11	Varies
Reach 3	05	-4.3	-1.6	+10.9	045	A9	Varies

[1]Flood Insurance Rate Map Panel
[2]Weighted Average
[3]Rounded to the nearest foot - see map

TABLE 3

FEDERAL EMERGENCY MANAGEMENT AGENCY
Federal Insurance Administration

TOWNSHIP OF WASHINGTON, PA
(LEHIGH CO.)

FLOOD INSURANCE ZONE DATA

LEHIGH RIVER

Zone B:	Areas between the Special Flood Hazard Area and the limits of the 500-year flood, including areas of the 500-year flood plain that are protected from the 100-year flood by dike, levee, or other water control structure; also, areas subject to certain types of 100-year shallow flooding where depths are less than 1.0 foot; and areas subject to 100-year flooding from sources with drainage areas less than 1 square mile. Zone B is not subdivided.
Zone C:	Areas of minimal flooding.
Zone D:	Areas of undetermined, but possible, flood hazards.

Table 3, "Flood Insurance Zone Data," summarizes the flood elevation differences, FHFs, flood insurance zones, and base flood elevations for the flooding source studied in detail in the Township of Washington.

5.4 Flood Insurance Rate Map Description

The Flood Insurance Rate Map for the Township of Washington is, for insurance purposes, the principal result of the Flood Insurance Study. This map (published separately) contains the official delineation of flood insurance zones and base flood elevation lines. Base flood elevation lines show the locations of the expected whole-foot water-surface elevations of the base (100-year) flood. This map is developed in accordance with the latest flood insurance map preparation guidelines published by the FIA.

6.0 OTHER STUDIES

Flood Insurance Studies for the Borough of Walnutport and the Township of East Penn have been completed (References 3 and 12). The results of this study are in exact agreement with the results of the Walnutport Study. Backwater created by Lehigh River flood flows is 1.2 feet higher than the starting water-surface elevation used in the East Penn study. This does not have an effect on the reach or flood hazard factors for East Penn, and higher water-surface elevations at the corporate limits will not extend beyond cross section B of the East Penn study.

Flood Insurance Studies for the Borough of Slatington and the Townships of North Whitehall and Lehigh are currently being prepared (References

13, 14, and 15). The results of those studies will be in exact agreement with the results of this study. Also, the Flood Hazard Boundary Map for the Township of Washington has been published (Reference 9).

This study is authoritative for purposes of the Flood Insurance Program, and the data presented here either supersede or are compatible with previous determinations.

7.0 LOCATION OF DATA

Survey, hydrologic, hydraulic, and other pertinent data used in this study can be obtained by contacting the office of the Insurance and Mitigation Division of the Federal Emergency Management Agency, Regional Director, Region III Office, Curtis Building, Sixth and Walnut Streets, Philadelphia, Pennsylvania 19106.

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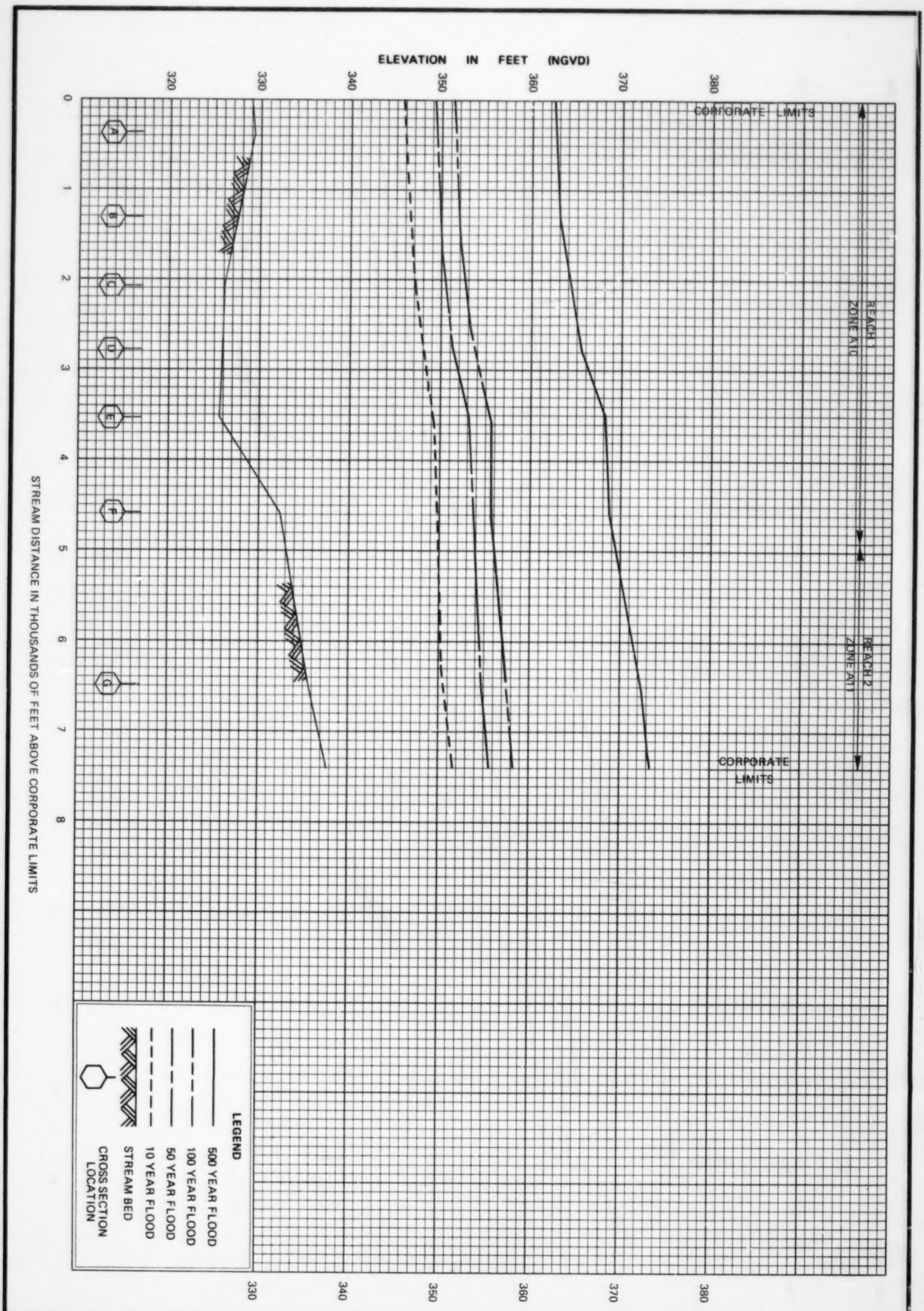

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